HIGH-THROUGHPUT ENZYME DISCOVERY AND ENGINEERING FOR BIOPROCESS OPTIMIZATION

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At Zymergen, we have developed a platform to engineer microbes for manufacturing chemicals and novel materials with unprecedented flexibility, efficiency, and reliability. This platform integrates several core technologies including high-throughput laboratory automation, custom software, and machine learning algorithms. We have recently extended this platform to bring enzyme discovery and engineering workflows to bear on both strain improvement projects and development of enzymes for industrial biocatalysis. These projects draw on two new capabilities that leverage our existing platform. First, novel enzyme homologs are identified from our proprietary metagenomics database, then tested for a desired activity using our high throughput platforms for strain build and screening. Second, leading enzyme candidates can be further optimized for a specified process using classical directed evolution methods. Each of these steps can be executed in a host chosen from panel of microbes that are compatible with Zymergen infrastructure; alternatively, our automation workflows can be modified to use a non-standard microbe that is currently being employed at scale. Using case studies, we will describe how we can apply these approaches to engineer enzymes with improved performance for a variety of applications.